What is claimed is:

1. An improvement in a method for creating a ligand for a target compound, said method comprising:

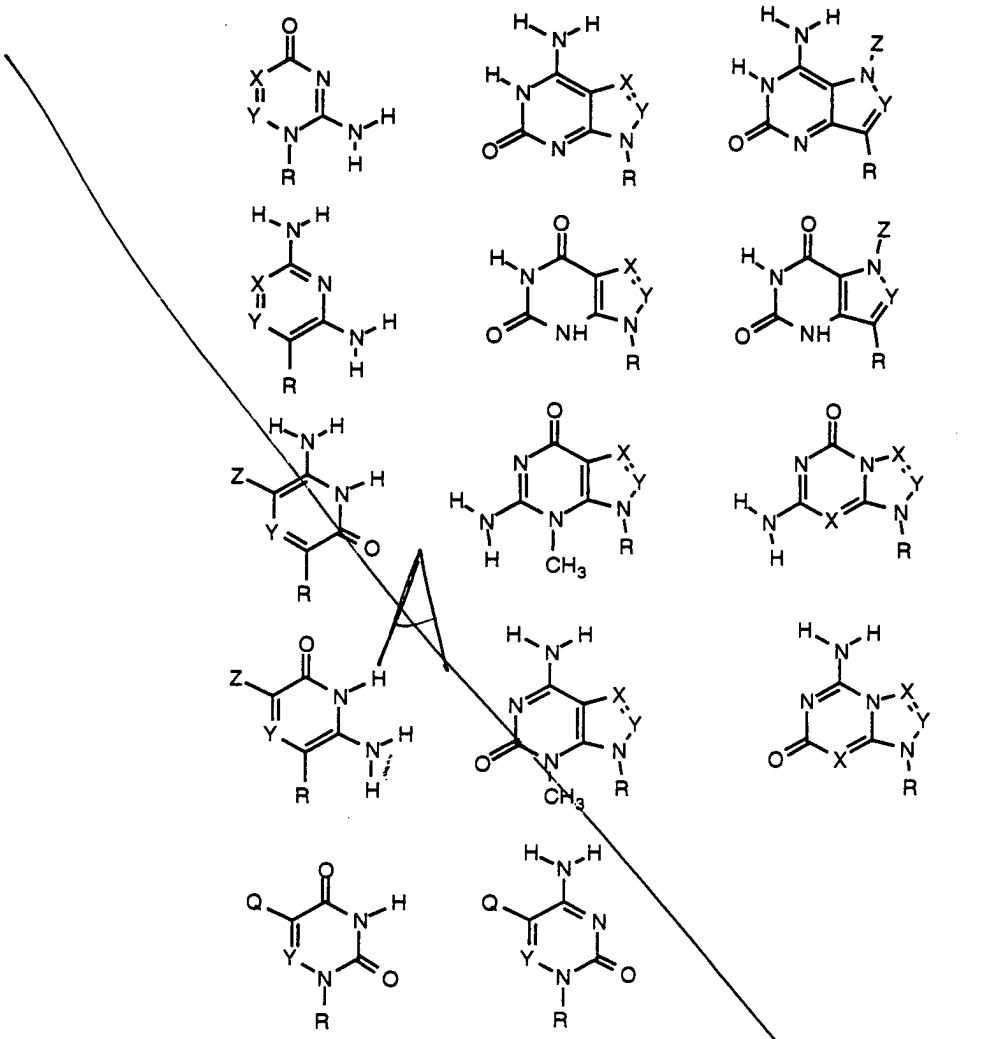
a) synthesizing a mixture of oligonucleotides from nucleotide building blocks each having a region of randomized sequence,

b) contacting said mixture with the target, wherein oligonucleotides having an increased affinity to the target relative to others in the mixture may be partitioned from the remainder of the mixture,

c) partitioning the oligonucleotides with increased affinity from the other oligonucleotides in the mixture,

d) amplifying the oligonucleotides having increased affinity *in vitro* to yield a mixture of oligonucleotides enriched in those with increased affinity for said target,

wherein the improvement comprises including among said nucleotide building blocks those carrying nucleobases selected from the group defined by the structural formulae below, wherein -R designates the point of attachment, X is either a nitrogen atom or a carbon atom bearing a substituent Z, Z is either a hydrogen, an unfunctionalized lower alkyl, alkynyl, or alkyl-alkynyl chain, or a lower alkyl, alkynyl , or alkyl-alkynyl chain bearing an amino, carboxyl, hydroxy, thiol, aryl, indole, or imidazoyl group, Y is either N or CH, Q is a lower alkyl, alkynyl , or alkyl-alkynyl chain bearing an amino, carboxyl, hydroxy, thiol, aryl, indole, or imidazoyl group, and the ring contains no more than three nitrogens consecutively bonded.

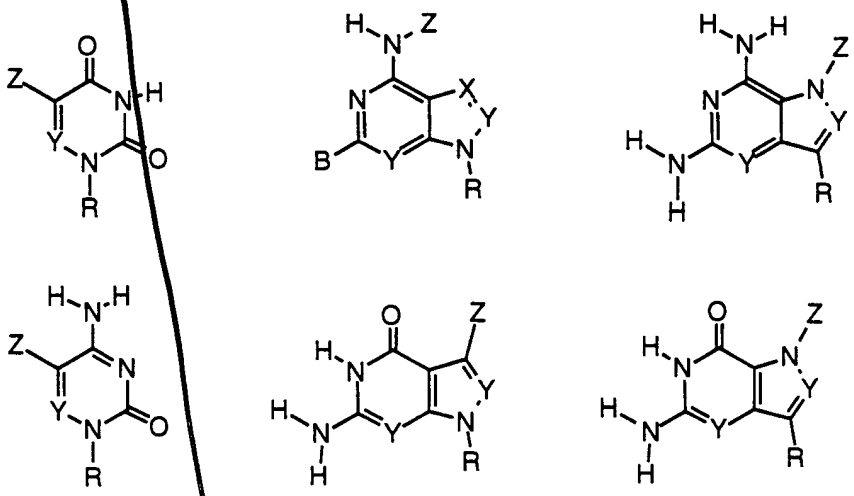


2. The improvement of claim 1 wherein said nucleobase is selected from the group consisting of 2,4-diaminopyrimidine, xanthine, 1-methyl-pyrazolo(4,3-d)pyrimidine-5,7(4H,6H)-dione), *iso*-guanine, and *iso*-cytosine.

Rule 1.126

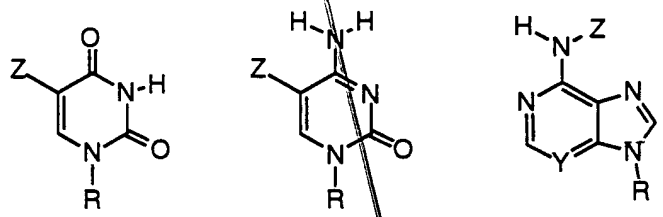
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3~~4~~. The improvement of claim 1 wherein said nucleobase is selected from the group consisting of



wherein -R designates the point of attachment, B is selected from the group consisting of -H or $-NH_2$, X is either a nitrogen atom or a carbon atom bearing a substituent Z, Z is either a hydrogen, an unfunctionalized lower alkyl, alkynyl, or alkyl-alkynyl chain, or a lower alkyl, alkynyl , or alkyl-alkynyl chain bearing an amino, carboxyl, hydroxy, thiol, aryl, indole, or imidazoyl group, Y is either N or CH, and the ring contains no more than three nitrogens consecutively bonded.

45. The improvement of claim 1 wherein said nucleobase is selected from the group consisting of



wherein Z is selected from the group consisting of $-C\equiv C-CH_2-NH_2$, $-C\equiv C-CH_2-SH$, $-CH_2CH_2-NH_2$, $-CH_2CH_2-SH$, $-CH_2CH_2$-phenyl, and-$CH_2CH_2CH_2CH_2CH_2CH_2-NH_2$.

56. An improvement in a method for creating a catalyst for a preselected reaction, said method comprising:

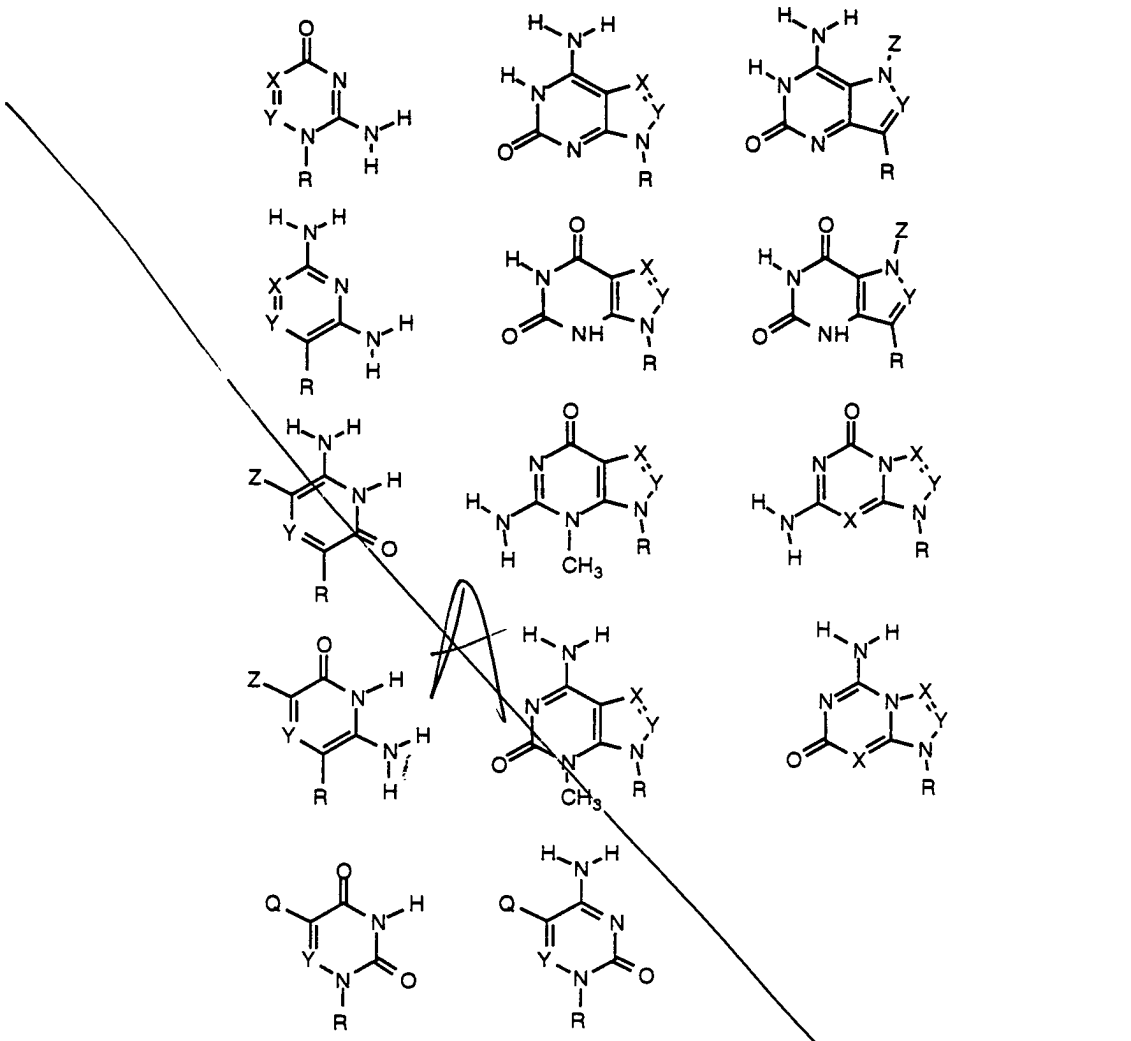
a) synthesizing a mixture of oligonucleotides from nucleotide building blocks each having a region of randomized sequence

b) incubating said mixture under conditions where oligonucleotides that catalyze said reaction undergo as a result of their catalytic activity a chemical transformation that makes them preferentially partitionable from or amplifiable to oligonucleotides in the remainder of the mixture that have diminished or none of said catalytic activity,

c) partitioning the oligonucleotides with increased catalytic activity from the other oligonucleotides in the mixture

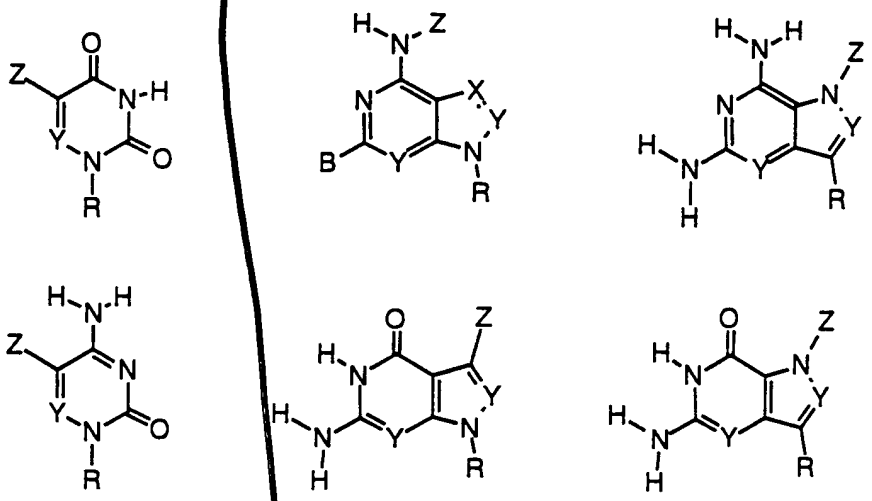
d) amplifying the oligonucleotides having increased affinity *in vitro* to yield a mixture of oligonucleotides enriched in those with increased affinity for said target,

wherein the improvement comprises including among said nucleotide building blocks those carrying nucleobases selected from the group defined by the structural formulae below, wherein -R designates the point of attachment, X is either a nitrogen atom or a carbon atom bearing a substituent Z, Z is either a hydrogen, an unfunctionalized lower alkyl, alkynyl, or alkyl-alkynyl chain, or a lower alkyl, alkynyl , or alkyl-alkynyl chain bearing an amino, carboxyl, hydroxy, thiol, aryl, indole, or imidazoyl group, Y is either N or CH, Q is a lower alkyl, alkynyl , or alkyl-alkynyl chain bearing an amino, carboxyl, hydroxy, thiol, aryl, indole, or imidazoyl group, and the ring contains no more than three nitrogens consecutively bonded.



17. The improvement of claim 6 wherein said nucleobase is selected from the group consisting of 2,4-diaminopyrimidine, xanthine, 1-methyl-pyrazolo(4,3-d)pyrimidine-5,7(4H,6H)-dione), *iso*-guanine, and *iso*-cytosine.

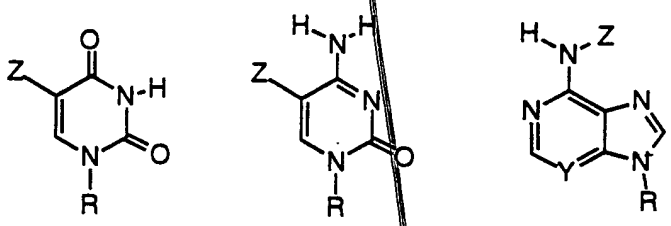
18. The improvement of claim 6 wherein said nucleobase is selected from the group consisting of



Sub D2

wherein -R designates the point of attachment, B is selected from the group consisting of -H or $-NH_2$, X is either a nitrogen atom or a carbon atom bearing a substituent Z, Z is either a hydrogen, an unfunctionalized lower alkyl, alkynyl, or alkyl-alkynyl chain, or a lower alkyl, alkynyl , or alkyl-alkynyl chain bearing an amino, carboxyl, hydroxy, thiol, aryl, indole, or imidazoyl group, Y is either N or CH, and the ring contains no more than three nitrogens consecutively bonded.

8 ~~10~~. The improvement of claim 6 wherein said nucleobase is selected from the group consisting of



wherein Z is selected from the group consisting of $-C\equiv C-CH_2-NH_2$, $-C\equiv C-CH_2-SH$, $-CH_2CH_2-NH_2$, $-CH_2CH_2-SH$, CH_2CH_2-phenyl, and-$CH_2CH_2CH_2CH_2CH_2CH_2-NH_2$.

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9 11. An improvement in a method for creating a catalyst for a preselected reaction, said method comprising:

a) synthesizing a mixture of oligonucleotides from nucleotide building blocks each having a region of randomized sequence

b) incubating said mixture under conditions where oligonucleotides that catalyze said reaction undergo as a result of their catalytic activity a chemical transformation that makes them preferentially partitionable from or amplifiable to oligonucleotides in the remainder of the mixture that have diminished or none of said catalytic activity,

c) partitioning the oligonucleotides with increased catalytic activity from the other oligonucleotides in the mixture

d) amplifying the oligonucleotides having increased affinity *in vitro* to yield a mixture of oligonucleotides enriched in those with increased affinity for said target,

wherein the improvement comprises including during step (b) an organic cofactor carrying an organic functional group with affinity for oligonucleotide.

10 12. The improvement of claim 9 11, wherein said cofactor has xxx